



The Korean Species of the Genus *Anisotoma* Panzer (Coleoptera: Leiodidae: Leiodinae)

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Abstract A taxonomic study of the genus *Anisotoma* Panzer in Korea is presented. Six species are recognized in Korea. Five species [*Anisotoma besucheti* Angelini and De Marzo, *A. castanea niponensis* Hisamatsu, *A. frontalis* (Portevin), *A. rubromaculata* Hisamatsu, and *A. smetanai* Angelini and De Marzo] are reported for the first time in Korea. *Anisotoma curta* (Portevin) is redescribed. A key, descriptions, and drawings of diagnostic characters of known Korean *Anisotoma* species are given.

Key words Taxonomy, Agathidiini, Fauna, Korea

INTRODUCTION

The genus *Anisotoma* Panzer belongs to the tribe Agathidiini Westwood. Members of *Anisotoma* mostly inhabit montane areas in Holarctic, Oriental, and northern Neotropical regions. Most of species are found from slime molds (Myxomycetes) but occasionally on fruiting bodies of Basidiomycetes. They feed on plasmodia and fruiting bodies of slime molds (Wheeler, 1979; Lawrence and Newton, 1980; Newton, 1984; Newton and Stephenson, 1990; Peck *et al.*, 1998).

The genus is characterized by combination of: body form convex to hemispherical, head narrowed behind compound eyes, antennomere 8 distinctly smaller than antennomeres 7 and 9, apical five-antennomeres clavate, male metasternum with one or two foveae or absent, elytra with 8 or 9 rows of punctures or absent, 5-5-4 male tarsal formula, 5-4-4 or 4-4-4 female tarsal formula, or rarely 4-4-4 tarsal formula in both sexes, and internal sac armature complex (Wheeler, 1979; Angelini and De Marzo, 1990, 1995).

More than 60 species of the genus *Anisotoma* have been recorded so far around the world (Wheeler, 1979; Hisamatsu, 1985; Angelini and De Marzo, 1990, 1995, 1998; Angelini and Svec, 1994, 1995; Peck *et al.*, 1998; Newton, 1998). Wheeler (1979) published a world revision and proposed a new classification system (six monophyletic species groups: *blanchardi*, *horni-errans*, *geminata*, *discolor-scopula*, *humeralis*, and *glabra*) based on phylogenetic analysis. In East Asia, eight and 11 species have been known to occur in China and Japan, respectively (Angelini and De Marzo, 1990; Svec, 1992; Angelini and Svec, 1994, 1995; Hoshina, 1998, 2000; Angelini and Cooter, 1999). However, *Anisotoma curta* (Portevin) is the only species recorded from Pyeongan (northern Korea) by Angelini (1992).

In this paper we report five *Anisotoma* species for the first time in Korea [*A. besucheti*

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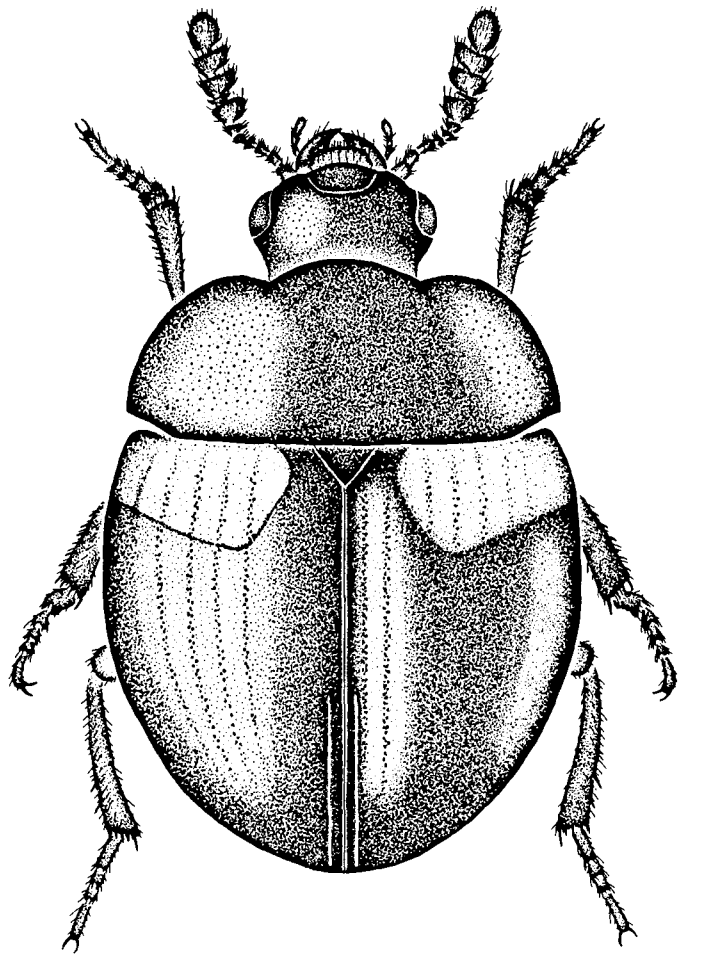


Fig. 1. Habitus of *Anisotoma rubromaculata* Hisamatsu. Scale bar = 0.5 mm.

Angelini and De Marzo, *A. castanea niponensis* Hisamatsu, *A. frontalis* (Portevin), *A. rubromaculata* Hisamatsu, and *A. smetanai* Angelini and De Marzo] and provide a key, descriptions, and illustrations of diagnostic characters. The terminology of taxonomic characters used in this study followed Wheeler (1979). Materials for this study were collected by FIT (flight intercept trap), sifting, and hand collecting from mushrooms and are deposited in the Chungnam National University Insect Collection (CNUIC), Daejeon.

Genus *Anisotoma* Panzer, 1797 등근우리알버섯벌레속 (신칭)

Anisotoma Panzer, 1797: 8; Wheeler, 1979: 266.

Pentatoma Schneider, 1792: 79.

Eucyrta Portevin, 1927: 81.

Type species: *Tritoma glabra* Fabricius, 1792.

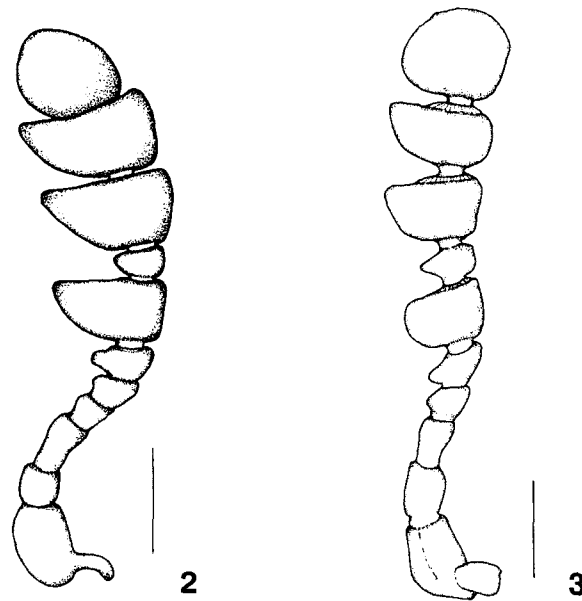
See Hatch (1929) for other references.

Diagnosis. Length 1.8–4.0 mm. Body slightly to strongly convex. Dorsum shining, usually

reddish brown to black, sometimes with reddish or orange patches on elytra. Head narrowed behind compound eyes (Fig. 1); compound eyes of most species oval and large. Antennae (Figs. 2 and 3) with 11 antennomeres, rarely 10 antennomeres; antennomere 8 distinctly smaller than antennomeres 7 and 9; apical five-antennomeres clavate; antennomere 3 longer than 2 or rarely reverse; 11 apically rounded. Mandible with molar lobe and penicillus. Pronotum about two times as wide as head; apically emarginate at middle. Male metasternum with one or two foveae or absent. Elytra with 8 or 9 rows of punctures or absent. Hind wings fully developed. Tarsal formula usually 5-5-4 in male, 5-4-4 or 4-4-4 in female, or rarely 4-4-4 in both sexes. Median lobe (Figs. 4-15) elongate, tubular; apex variable; internal sac armature usually complex; parameres (Figs. 4-15) with apical two setae or rarely absent, slender, variable in length. Spermatheca (Figs. 16-21) variable in shape, often swollen at base.

Key to the species of the genus *Anisotoma* in Korea

1. Elytra without rows of punctures; antennae (Fig. 3) with 10 antennomeres, antennomere 2 longer than 3; tarsal formula 4-4-4 in both sexes *Anisotoma smetanai*
 - Elytra with rows of punctures; antennae with 11 antennomeres, antennomere 2 shorter than 3; tarsal formula 5-5-4 in male, 5-4-4 or 4-4-4 in female 2
2. Elytra with red patches (Fig. 1) *A. rubromaculata*
 - Elytra almost concolorous on dorsum 3
3. Metasternum without foveae; male front and middle tarsi with tarsomeres 1-3 large and expanded; median lobe and parameres sinuate in lateral aspect (Fig. 11) *A. castanea niponensis*
 - Metasternum with single or paired foveae in male; male front and middle tarsi normal; median lobe and parameres not sinuate in lateral aspect 4



Figs. 2-3. Antennae: 2. *Anisotoma rubromaculata* Hisamatsu; 3. *A. smetanai* Angelini and De Marzo. Scale bars = 0.1 mm.

4. Body 2.4–2.6 mm; median lobe apically pointed (Fig. 4); parameres without apical setae, short, about a half of median lobe (Figs. 4 and 10); spermatheca without spermathecal gland (Fig. 16) *A. besucheti*
 – Body 2.8–3.9 mm; median lobe apically narrowed or emarginated; parameres with apical two long setae, near apical end of median lobe; spermatheca with spermathecal gland 5
 5. Rows of punctures on elytra arranged irregularly; metasternum with transversally long paired foveae in male; tarsal formula 4–4–4 in female; median lobe apically narrowed (Fig. 7); median foramen expanded (Fig. 13); spermatheca swollen at middle (Fig. 19) *A. frontalis*
 – Rows of punctures on elytra arranged straightly; metasternum with small single fovea in male; tarsal formula 5–4–4 in female; median lobe emarginate deeply along apical margin (Fig. 6); median foremen not expanded (Fig. 12); spermatheca slender and long (Fig. 18) *A. curta*

***Anisotoma besucheti* Angelini and De Marzo, 1990 꼬마등근우리알버섯벌레 (신칭)**

(Figs. 4, 10, 16)

Anisotoma besucheti Angelini and De Marzo, 1990: 62.

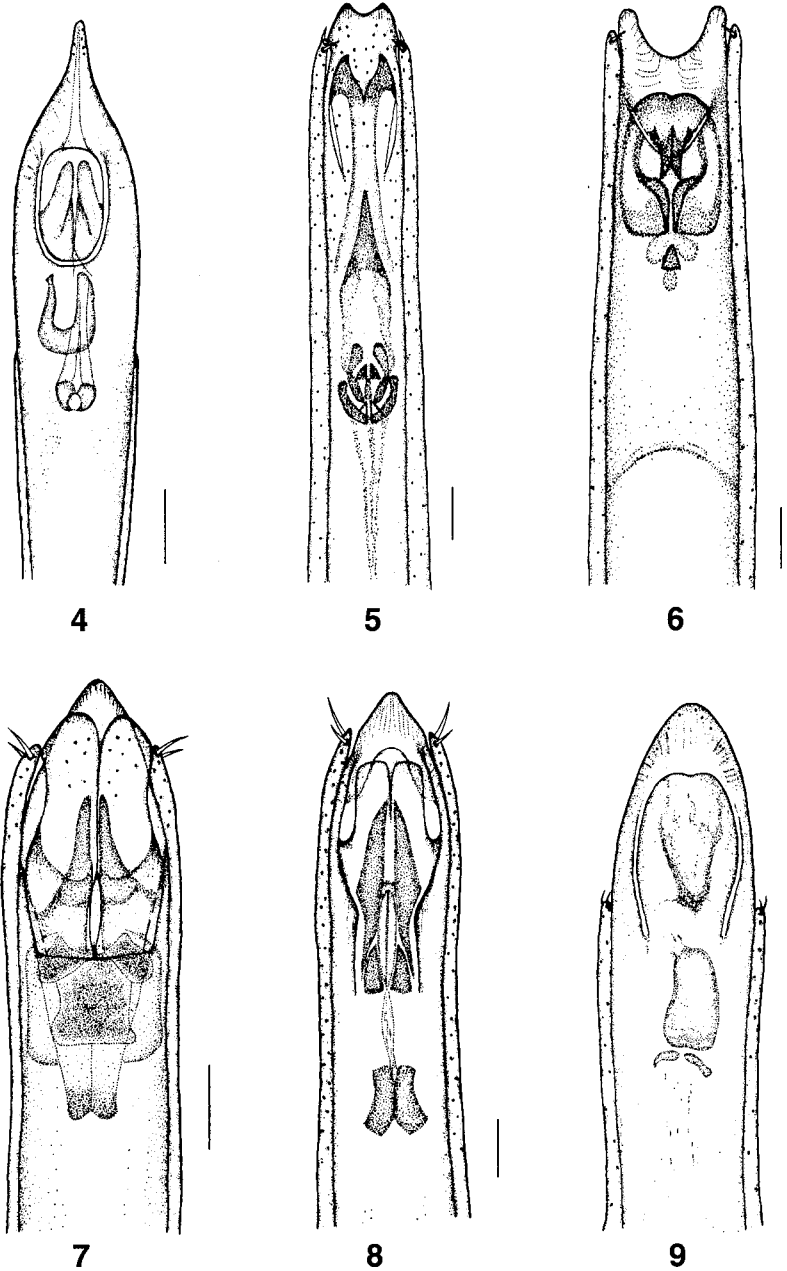
Diagnosis. Length 2.4–2.6 mm. Body very convex, about 1.8 times as long as wide. Dorsum almost concolorous, reddish brown or dark brown in general; antennomeres 1–6, 8, and apical one-third of 11 reddish brown, 7, 9–10, and basal two-thirds of 11 dark brown; legs reddish brown. Head minutely and densely punctate, not microreticulate. Antennae about 1.2 times as wide as head; antennomere 3 about 1.4 times as long as 2. Pronotum with minuter and sparser punctures than head, not microreticulate. Elytra with 9 rows of punctures, very minute and sparse punctures between rows, not microreticulate. Metasternum with small paired fovea in male. Tarsal formula 5–5–4 in male, 4–4–4 in female. Median lobe (Figs. 4 and 10) elongate, weakly curved, apically pointed; median foramen apically rounded. Parameres (Figs. 4 and 10) about a half of median lobe without apical setae; basal piece of parameres apically rounded. Spermatheca (Fig. 16) without spermathecal gland, swollen at base.

Materials examined. Holotype, ♂, Usui pass (700 m), Gunma Pref., Honshu, Japan, 20 VII 1980, I. Löbl leg. (preserved in the collection of Muséum d'Histoire naturelle, Genève); 1 ♂, Baekdansa, Mt. Taebaeksan, Taebaek–City, Gangwon Prov., 14 VII 1999, W.–S. Hwang and H.–J. Kim, *ex* FIT; 1 ♀, Baekdansa, Mt. Taebaeksan, Taebaek–City, Gangwon Prov., 16 VII 1999, W.–S. Hwang and H.–J. Kim, *ex* FIT; 4 ♂♂, 3 ♀♀, Sangwonsa, Mt. Odaesan, Dongsan–ri, Jinbu–myeon, Pyeongchang–gun, Gangwon Prov., 4 VI–22 VI 2001, K.–J. Ahn, S.–J. Park, M.–S. Kim, and M.–J. Jeon, *ex* FIT; 2 ♂♂, 2 ♀♀, Sangwonsa, Mt. Odaesan, Dongsan–ri, Jinbu–myeon, Pyeongchang–gun, Gangwon Prov., 22 VI–16 VIII 2001, S.–J. Park and C.–W. Shin, *ex* FIT; 1 ♀, Gwaneumsa, Mt. Baekdeoksan, Suju–myeon, Pyeongchang–gun, Gangwon Prov., 13 VII–15 VIII 2001, K.–J. Ahn, S.–J. Park, and C.–W. Shin, *ex* FIT; 1 ♂, Mt. Sambangsan, Noron–ri, Pyeongchang–eup, Pyeongchang–gun, Gangwon Prov., 13 VII–15 VIII 2001, K.–J. Ahn, S.–J. Park, and C.–W. Shin, *ex* FIT; 4 ♂♂, 3 ♀♀, Mt. Baekdeoksan, Meokgol, Unkyo 2–ri, Bangrim–myeon, Pyeongchang–gun, Gangwon Prov., 12 VII–16 VIII 2001, K.–J. Ahn, S.–J. Park, and C.–W. Shin, *ex* FIT; 1 ♀, Sangwonsa, Mt. Odaesan, Dongsan–ri, Jinbu–myeon, Pyeongchang–gun, Gangwon Prov., 15 IX 2001, S.–J. Park, *ex* mushroom.

Distribution. Korea, Japan.

***Anisotoma castanea niponensis* Hisamatsu, 1985** 넓적등근우리알버섯벌레 (신칭)
(Figs. 5, 11, 17)

Anisotoma castanea niponensis Hisamatsu, 1985: 9; Angelini and De Marzo, 1990: 60.



Figs. 4-9. Aedeagi, ventral aspect: 4. *Anisotoma besucheti* Angelini and De Marzo; 5. *A. castanea niponensis* Hisamatsu; 6. *A. curta* (Portevin); 7. *A. frontalis* (Portevin); 8. *A. rubromaculata* Hisamatsu; 9. *A. smetanai* Angelini and De Marzo. Scale bars = 0.1 mm.

Anisotoma castanea: Portevin 1914: 227, 235; 1927: 81, 93.

Diagnosis. Length 3.7–3.9 mm. Body slightly convex, about 1.8 times as long as wide. Head and pronotum dark brown; apical margin of head, margin of pronotum, and elytra reddish brown; antennomeres 1–4 and 11 brown, 5–10 reddish brown; legs reddish brown. Head minutely and densely punctate, not microreticulate. Antennae about 1.2 times as wide as head; antennomere 3 about 1.2 times as long as 2. Pronotum with minuter and sparser punctures than head, not microreticulate. Elytra with 9 double rows of punctures, minute and dense punctures between rows, rows arranged irregularly, not microreticulate. Metasternum without foveae in male. Tarsal formula 5–5–4 in male, 4–4–4 in female; male front and middle tarsi with tarsomeres 1–3 large and expanded. Median lobe (Figs. 5 and 11) elongate, sinuate in lateral aspect, narrowed before apex, moderately deeply emarginate along apical margin; median foramen strongly expanded. Parameres (Figs. 5 and 11) reached near apex of median lobe, sinuate as median lobe, with apical paired setae. Spermatheca (Fig. 17) long and slender, with spermathecal gland, base twisted.

Materials examined. Holotype, ♂, Mt. Moiwa, Hokkaido, Japan, 3 VIII 1970, M. Sakai leg. (preserved in the collection of Ehime University); 1 ♀, Unduryeong, Mt. Gyeongbongsan, Nae-myeon, Hongcheon-gun, Gangwon Prov., 24 VIII 2000, M.-H. Kim, *ex* mushroom; 1 ♂, Sangwonsa, Mt. Odaesan, Dongsan-ri, Jinbu-myeon, Pyeongchang-gun, Gangwon Prov., 22 VI – 16 VIII 2001, S.-J. Park and C.-W. Shin, *ex* FIT.

Distribution. Korea, Japan.

Remarks. This species is similar in aedeagus shape to *Anisotoma geminata* (Horn, 1880), but is distinguished from the latter by spermatheca with spermathecal gland and median lobe moderately sinuate.

***Anisotoma curta* (Portevin, 1927) 검정등근우리알버섯벌레 (신칭)**
(Figs. 6, 12, 18)

Eucyrtia curta Portevin, 1927: 83.

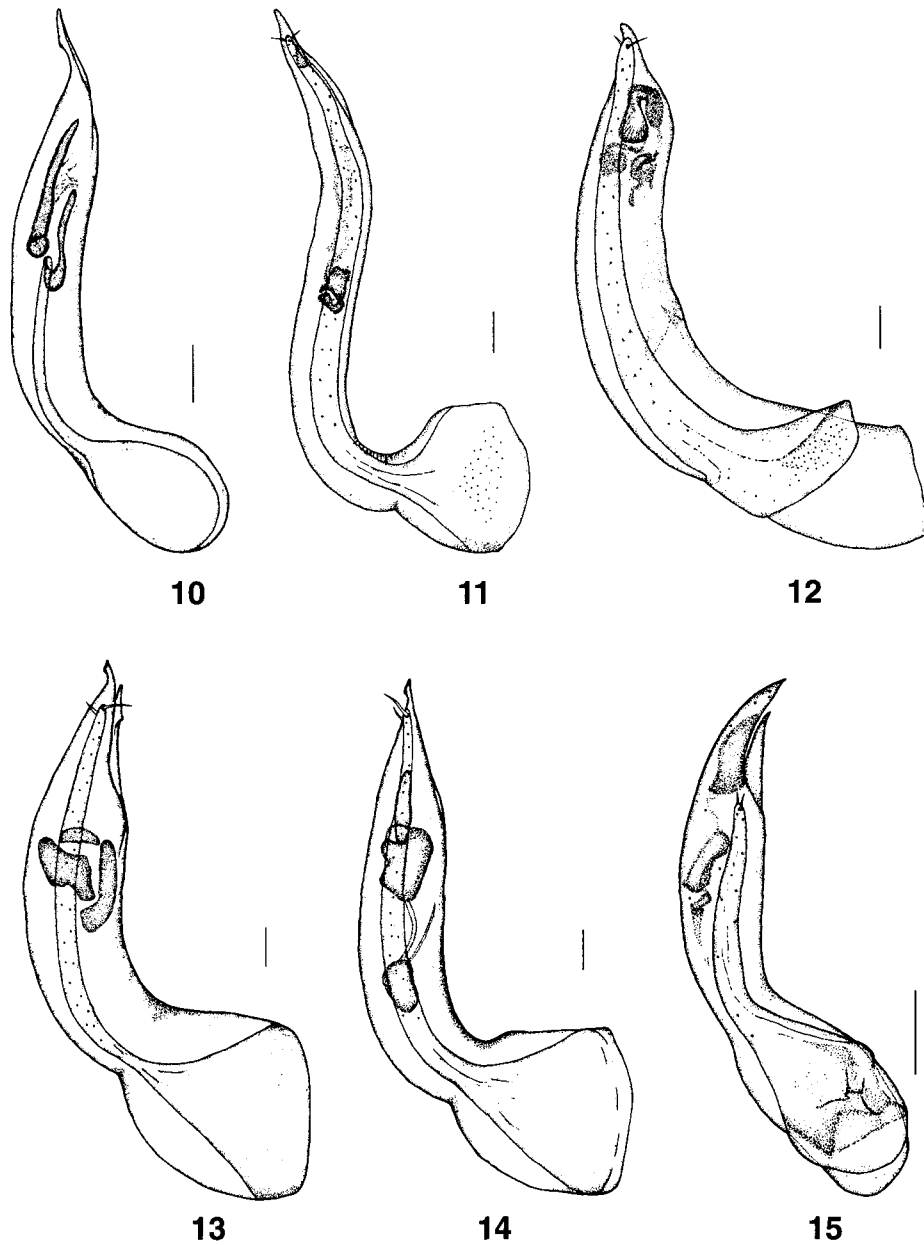
Anisotoma curta: Wheeler, 1979: 301; Perkovsky, 1988: 80; Lafer, 1989: 325; Angelini and De Marzo, 1990: 56; Angelini, 1992: 432; Angelini and Svec, 1994: 7.

Diagnosis. Length 3.1–3.9 mm. Body very convex, about 1.7 times as long as wide. Dorsum almost concolorous, black; antennomeres 1–6, 8, and apical one-third of 11 reddish brown, 7, 9–10, and basal two-thirds of 11 dark brown; legs reddish brown. Head minutely and densely punctate, not microreticulate. Antennae about 1.3 times as wide as head; antennomere 3 about 1.5 times as long as 2. Pronotum minutely and densely punctate, not microreticulate. Elytra with 9 rows of punctures, very sparse and minute punctures or almost no puncture between rows, rows ordered in general, not microreticulate. Metasternum with small single fovea in male. Middle and hind femurs with a denticle near middle in male. Tarsal formula 5–5–4 in male, 5–4–4 in female. Median lobe (Figs. 6 and 12) elongate, simply curved, deeply emarginate and rounded along apical margin; median foramen not expanded. Parameres (Figs. 6 and 12) reached near apex of median lobe, with apical paired setae, basally thicker in lateral aspect. Spermatheca (Fig. 18) long and slender, with spermathecal gland.

Materials examined. 1 ♂, Sangwonsa, Mt. Odaesan, Dongsan-ri, Jinbu-myeon, Pyeongchang-gun, Gangwon Prov., 22 VI – 16 VIII 2001, S.-J. Park and C.-W. Shin, *ex* FIT; 1 ♀, Sangwonsa, Mt. Odaesan, Dongsan-ri, Jinbu-myeon, Pyeongchang-gun, Gangwon Prov., 15 IX – 14 XI 2001, K.-J. Ahn and C.-W. Shin, *ex* FIT.

Distribution. Korea, Japan, China, Russian Far East.

Remarks. Angelini (1992) recorded this species for the first time from Pyeongan (northern Korea) based on single specimen. We collected them in southern Korea as well.



Figs. 10-15. Aedeagi, lateral aspect: 10. *Anisotoma besucheti* Angelini and De Marzo; 11. *A. castanea niponensis* Hisamatsu; 12. *A. curta* (Portevin); 13. *A. frontalis* (Portevin); 14. *A. rubromaculata* Hisamatsu; 15. *A. smetanai* Angelini and De Marzo. Scale bars = 0.1 mm.

***Anisotoma frontalis* (Portevin, 1927) 등근우리알버섯벌레 (신칭)**
(Figs. 7, 13, 19)

Eucyrtia frontalis Portevin, 1927, 82.

Anisotoma frontalis: Wheeler, 1979: 303; Angelini and De Marzo, 1990: 60.

Diagnosis. Length 2.8–3.9 mm. Body convex, about 1.6 times as long as wide. Dorsum almost concolorous, reddish brown or dark brown in general; antennomeres 1–6 and 8 reddish brown, 7, 9–10, and basal two-thirds of 11 black, apical one-third of 11 brown; legs reddish brown. Head minutely and sparsely punctate, not microreticulate. Antennae about 1.2 times as wide as head; antennomere 3 about 1.2 times as long as 2. Pronotum minutely and sparsely punctate, not microreticulate. Elytra with 9 rows of punctures, very sparse or almost no puncture between rows, a few additional punctures besides rows, rows often irregular, not microreticulate; many long and very thin setae present along lateral and apical margins of elytra. Metasternum with transversally long paired foveae in male. Hind femurs with a tooth distally in male. Tarsal formula 5–5–4 in male, 4–4–4 in female. Median lobe (Figs. 7 and 13) elongate and tubular, apically constricted, somewhat curved; median orifice apically expanded and covered near apex of median lobe; median foramen dorsally expanded. Parameres (Figs. 7 and 13) reached near apex of median lobe, with apical large paired setae. Spermatheca (Fig. 19) with spermathecal gland.

Materials examined. Holotype, ♂, Tokio (= Tokyo), Honshu, Japan, 1906, E. Galloisi leg. (preserved in the collection of Muséum National d'Histoire naturelle, Paris); 1 ♂, Mt. Seondalsan, Bonghwa-gun, Gyeongbuk Prov., 23–25 VI 1998, K.–L. You and H.–J. Lim, *ex* FIT; 1 ♂, Guryong Area, Mt. Chiaksan, Wonju-City, Gangwon Prov., 10 VII 1999, W.–S. Hwang and H.–J. Kim *ex* FIT; 3 ♂♂, 1 ♀, Mt. Baekdeoksan, Meokgol, Unkyo 2-ri, Bangrim-myeon, Pyeongchang-gun, Gangwon Prov., 12 VII – 16 VIII 2001, K.–J. Ahn, S.–J. Park, and C.–W. Shin, *ex* FIT; 1 ♂, 1 ♀, Mt. Taehwasan, Yeongchun-myeon, Danyang-gun, Chungbuk Prov., 14 VII–14 VIII 2001, K.–J. Ahn, S.–J. Park, and C.–W. Shin, *ex* FIT; 1 ♀, Mt. Myeongjisan, Buk-myeon, Gapyeong-gun, Gyeonggi Prov., 25 VII–30 VIII 2001, K.–J. Ahn, S.–J. Park, and C.–W. Shin, *ex* FIT.

Distribution. Korea, Japan.

Remarks. This species is similar to *Anisotoma didymata* (Portevin, 1927), but is distinguished from the latter by pronotum not microreticulate and punctate minutely and sparsely.

***Anisotoma rubromaculata* Hisamatsu, 1985 붉은무늬등근우리알버섯벌레 (신칭)**
(Figs. 1, 2, 8, 14, 20)

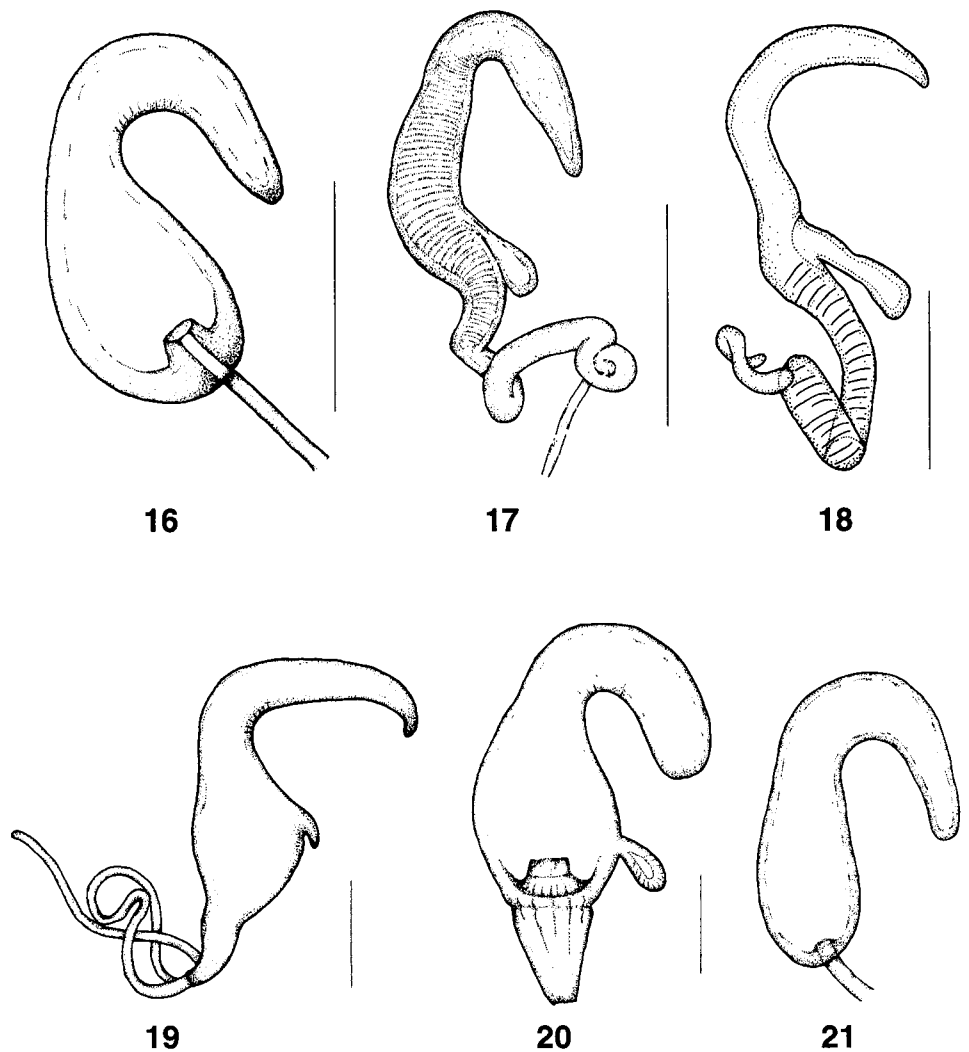
Anisotoma rubromaculata Hisamatsu, 1985: 10; Angelini and De Marzo, 1990: 58; Svec, 1992: 4.

Diagnosis. Length 3.2–4.0 mm. Body convex, about 1.6 times as long as wide. Head and pronotum black; elytra usually black, sometimes dark brown, with red patches near humeri (Fig. 1); antennomeres 1–6 and 8 reddish brown, 7, 9–10, and basal two-thirds of 11 black, apical one-third of 11 brown; legs brown. Head minutely and densely punctate, weakly microreticulate. Antennae about 1.4 times as wide as head, antennomere 3 about 1.2 times as long as 2 (Fig. 2). Pronotum minutely and densely punctate, weakly microreticulate. Elytra with 9 rows of punctures, minute and dense punctures between rows, not microreticulate. Metasternum with small paired foveae in male. Tarsal formula 5–5–4 in male, 5–4–4 in female. Median lobe (Figs. 8 and 14) elongate, apically constricted, somewhat curved; median foramen expanded. Parameres (Figs. 8 and 14) reached near apex of median lobe, with apical large paired setae. Spermatheca (Fig. 20) with spermathecal gland.

Materials examined. Holotype, ♂, Sôunkyô, Hokkaido, Japan, 4 IX 1977, M. Miyatake leg.

(preserved in the collection of Ehime University); 8 specimens, Gwangneung, Pochon-gun, Gyeonggi Prov., 14–19 V 1992, M.T. Chûjô leg.; 2 specimens, Piagol, Mt. Jirisan, Gurye-gun, Jeonnam Prov., 24–27 V 2000, K.-J. Ahn, S.-J. Park, and W.-S. Hwang, *ex* FIT; 8 ♂♂, 10 ♀♀, Sangwonsa, Mt. Odaesan, Dongsan-ri, Jinbu-myeon, Pyeongchang-gun, Gangwon Prov., 30 IV–4 VI 2001, K.-J. Ahn, S.-J. Park, M.-S. Kim, and M.-J. Jeon, *ex* FIT; 6 ♂♂, 8 ♀♀, Sangwonsa, Mt. Odaesan, Dongsan-ri, Jinbu-myeon, Pyeongchang-gun, Gangwon Prov., 4 VI–22 VI 2001, K.-J. Ahn, S.-J. Park, M.-S. Kim, and M.-J. Jeon, *ex* FIT; 3 ♂♂, 1 ♀, Sangwonsa, Mt. Odaesan, Dongsan-ri, Jinbu-myeon, Pyeongchang-gun, Gangwon Prov., 22 VI–16 VIII 2001, S.-J. Park and C.-W. Shin, *ex* FIT.

Distribution. Korea, Japan, Russian Far East.



Figs. 16–21. Spermathecae: 16, *Anisotoma besucheti* Angelini and De Marzo; 17, *A. castanea ninponensis* Hisamatsu; 18, *A. curta* (Portevin); 19, *A. frontalis* (Portevin); 20, *A. rubromaculata* Hisamatsu; 21, *A. smetanai* Angelini and De Marzo. Scale bars = 0.1 mm.

Remarks. This species is similar to *Anisotoma axillaris* Gyllenhal, 1810, but is distinguished from the latter by aedeagus relatively thick and simply pointed at apex. Svec (1992) reported that Russian specimens have elytra with smaller red patches than Japanese specimens. Korean specimens also have relatively small patches on elytra.

***Anisotoma smetanai* Angelini and De Marzo, 1995** 아기둥근우리알버섯벌레 (신칭)
(Figs. 3, 9, 15, 21)

Anisotoma smetanai Angelini and De Marzo, 1995: 181.

Diagnosis. Length 1.8–2.0 mm. Body very convex, about 1.8 times as long as wide. Head dark brown; apical margin of head, pronotum, and elytra brown or reddish brown; antennomeres 1–5 and 7 reddish brown, 6 and 8–10 dark brown; legs reddish brown. Head minutely and densely punctate, not microreticulate. Antennae with 10 antennomeres, almost as wide as head, antennomere 2 about 1.2 times as long as 3 (Fig. 3). Pronotum with minuter and sparser punctures than head, not microreticulate. Elytra without rows of punctures, punctate minutely and densely as head, not microreticulate. Metasternum with large single fovea in male. Tarsal formula 4–4–4 in both sexes. Median lobe (Figs. 9 and 15) elongate, weakly curved, apically rounded. Parameres (Figs. 9 and 15) short, about three-fifths length of median lobe, with apical small paired setae. Spermatheca (Fig. 21) without spermathecal gland, slightly swollen at base.

Materials examined. Holotype, ♂, Hualien Hsien, Taroko N. P., Nanhushi Hut, 2220 m, Taiwan, 12 V 1990 (preserved in the collection of Muséum d'Histoire naturelle, Genève); 1 ♂, Piagol, Mt. Jirisan, Gurye-gun, Jeonnam Prov., 24–27 V 2000, K.–J. Ahn, S.–J. Park, and C.–W. Shin, *ex* FIT; 1 ♂, Sangwonsa, Mt. Odaesan, Dongsan-ri, Jinbu-myeon, Pyeongchang-gun, Gangwon Prov., 4 VI–22 VI 2001, K.–J. Ahn, S.–J. Park, M.–S. Kim, and M.–J. Jeon, *ex* FIT; 1 ♂, 1 ♀, Sangwonsa, Mt. Odaesan, Dongsan-ri, Jinbu-myeon, Pyeongchang-gun, Gangwon Prov., 22 VI–16 VIII 2001, S.–J. Park and C.–W. Shin, *ex* FIT; 1 ♂, Mt. Taehwasan, Yeongchun-myeon, Danyang-gun, Chungbuk Prov., 14 VII–14 VIII 2001, K.–J. Ahn, S.–J. Park, and C.–W. Shin, *ex* FIT.

Distribution. Korea, Taiwan.

Remarks. This species can be easily distinguished from other Korean species by a small body, antennae with 10 antennomeres, and antennomere 2 longer than 3.

Acknowledgments We thank Drs. G. Cuccodoro and I. Löble (Muséum d'Histoire naturelle, Genève, Swiss), Dr. N. Berti (Muséum National d'Histoire naturelle, Paris, France), and Drs. M. Sakai and N. Ôbayashi (Ehime University, Ehime, Japan) for loan of type specimens used in this paper. We also thank Mr. F. Angelini (Brindisi, Italy), Dr. Z. Svec (Praha, Czech Republic), Dr. S.B. Peck (Carleton University, Ottawa, Canada), and Mr. J. Cooter (Hereford, England) who generously provided us valuable references.

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